

Antimicrobial Technology

ENGINEERED WATER SOLUTION



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Bio-Safe is an advanced manufacturer and distributor of disinfection products and services obtained through engineered water, gas, and fogging.

Founded by the Expert

- Dan Lynn is one of the foremost experts on pathogenic control research and ozone effectiveness & application.
- He is an FDA Clinical Investigator, HACCP and infectious disease certified, and is an Agra-Terrorism and Bio-Security expert for the U.S. Department of Homeland Security.
- Lynn's numerous patents related to cleaning and pathogenic control led to the founding of Bio-Safe.



Bio-Safe is environmentally-friendly, chemical-free and safe to use as it utilizes true oxygen and water as a byproduct...because clean matters.



Bio-Safe Technology

- Our patented processes relates to methods and systems for controlling microorganisms in the water by adding oxidation that meets World Health Organization (WHO) standards for disinfection.
- The methods and systems generate an oxidization reduction potential that provides pathogenic control of the solution as well as pathogenic control of the surfaces that the solution comes in immediate contact with.



Bio-Safe Technology

- The systems and methods provide a safe, economical, easy to handle and environmentally friendly solution for maintaining **pathogenic** control both in the water and on contact surfaces.
- The systems and methods remove contaminants from the water and supplies a continuous cleaner and sanitizer on contact surfaces, created on-site and on-demand without any additional chemicals, supplies or additives.



The Science Behind Our Patented Technology

United States Patent

US 10,597,317

SYSTEMS AND METHODS FOR CREATING AN OXIDATION REDUCTION
POTENTIAL (ORP) IN WATER FOR PATHOGENIC CLEANSING AND/OR
DEGREASING OF HARD SURFACES AND EQUIPMENT.

Abstract

- A system and method for creating an oxidation reduction potential (ORP) in water and for reducing the surface tension of the water for the pathogenic cleansing and/or degreasing of hard surfaces and equipment.
- The hard surfaces to be cleansed and/or degreased may be plastic, glass, ceramic, porcelain and stainless steel.



Abstract

The equipment to be cleansed and/or degreased may consist of food service equipment such as:

Ovens	Ranges	Fryers	Grills
Steam Cookers	Refrigerators	Coolers	Holding Cabinets
Cold Food Storage	Worktables	Beverage Dispenser	Beer Dispenser
Shelving	Food Displays	Dishwashing Equip	Grease Traps



Commitment to our Customers

- Patented product and applications
- Manufactured by professional electrical engineers
- Commitment to Quality, Workmanship, Design, Function
- All designs comply to NEC and or UL/CUL codes
- Flexible warranty and out of warranty repairs
- Professional application integration



Our Unique Brand of Ozone

- Biosecurity Technology's ozone generators utilize oxygen molecules from the air (O_2) and pass them through a corona field, splitting them into single atoms of oxygen (O_1).
- These atoms combine with an O_2 molecule to form a molecule of O_3 (Ozone). It turns back into oxygen, leaving no harmful byproducts or residuals - making it environmentally friendly and safe.



Our Unique Brand of Ozone

- Ozone has been given GRAS (Generally Recognized as Safe) approval by the USDA and the FDA for direct contact with food products, including all meat and poultry products.
- While good manufacturing procedures must be in place, no regulations exist on levels of ozone in food processing applications.
- The final rule from the FDA providing GRAS approval was given in 2001, the USDA followed with the final rule granting GRAS approval for ozone in 2002.



Organic Antimicrobial / Biocide

- Products are engineered to the required ORP of the customers application
- FDA Approved as an Antimicrobial
- FDA Approved as a direct food additive
- USDA Approved as a Hard Surface Cleaner/Sanitizer
- EPA Registered
- Comply with all regulatory requirements



What is ORP? How and when to use it?

Making the Case For ORP

- Oxidation-reduction potential (ORP, redox) measures the rate of oxidative disinfection caused by the addition of the effects of all oxidants.
- ORP is determined by using a high quality ORP probe and meter.
- The unit of measurement of ORP is millivolts (mV).



Making the Case For ORP

- Oxidizers (mainly disinfectants) consume electrons while reductants (mainly contaminants) donate electrons.
- The ORP is the potential of a disinfectant to do its work of inactivating micro-organisms and oxidizing organic materials.
- The higher the millivolt reading, the more powerfully the solution is able to oxidize and disinfect.



Making the Case For ORP

- ORP instrumentation can be used to monitor and control the effectiveness of the disinfectant.
- ORP measures the actual oxidation power of the solution, specifically the strength and number of oxidation and reduction reactions in solution, this yields a clear picture of the efficacy present, regardless of the concentration.



Making the Case For ORP

- Measuring ORP directly reflects the sanitizing power of the solution.
- The measurement of ORP is precise, empirical and requires no user interpretation, making it ideal for water quality and industrial process control.



Making the Case For ORP

*Survival in seconds (s) or hours (h) at ORP (mV)

Pathogen/Indicator	< 485	550 < X < 620	> 665
E. Coli 0157:H7	> 300s	< 60s	< 10s
Salmonella spp.	> 300s	> 300s	< 20s
Listeria monocytogenes	> 300s	> 300s	< 30s
Thermotolerant	> 48h	> 48h	< 30s



The Bio-Safe Commitment

Commitment of Knowledge

- Agro-terrorism and Bio-Security Diploma – Homeland Security - University of Tennessee
- USDC/NOAA HACCP QMP Certificate – U.S. Department of Commerce Quality Management
- Certification – U.S. Department of Commerce
- Clinical Investigator Certification – Food and Drug Administration
- U.S. Public Health Safety Security and Bioterrorism –Food and Drug Administration
- Infection Disease Control for N.Y. and N.J. Healthcare Professionals
- Bachelor of Science Degree In Industrial Management with a Concentration in Food Technology
- Master of Science Degree in Applied Science and Technology
- Inventor of Over 30 United States Patents

Commitment to Safety

- Hazwoper Supervisor – Occupational Safety and Health Administration
- Certificate of Recognition (COR) Program – Construction Safety Association CSO
- Certified Safety Officer (CSO) – Safety Administration – Construction Safety
- Association Claims Management – Safety Management – Leadership for Safety
- Excellence Certified Safety Auditor – Electrical Safety – Construction Safety
- Association Confined Space Entry – Fall Protection Systems – Construction
- Safety Association Forklift Safety – Workplace Hazardous Materials Information Systems
- H2S Alive – Petroleum Industry Training Service Fireman's Certificate (Boiler and Pressure Vessel) – Environment and Public Safety Standard First Aid and CPR – St. John Ambulance

Commitment to Effective Sanitation Practices

- To control pathogens and prevent foodborne illness such as:
 - *Listeria monocytogenes*
 - *Salmonella*
 - *Staphylococcus aureus*
 - E-Coli
- To control normal spoilage bacteria such as yeast, mold and others that can cause economic spoilage and decrease shelf life.



Commitment to Greater Outcomes

- Kills 99.999% all pathogens, including SALMONELLA, E-COLI, STAPH, LISTERIA, MOLD, PESTICIDES, BACTERIA AND VIRUSES.
- Meets and exceeds the WHO's standard for oxidation reduction potential (ORP) of 650MV. Therefore all bacteria – whether Gram Negative or Gram Positive are destroyed.
- Produces 100% Chemical-free Solution – completely safe, biodegradable, and require no treatment in wastewater process.



Commitment to Greater Outcomes

- Breaks down stubborn biofilms by oxidizing the protein bonds that protect layers of microorganisms and residue left behind by chemical cleaners.
- Leaves no chemical residual, reverts back to its original state of oxygen and water.
- Eliminates:
 - 90% of your chemicals
 - 90% of your energy that you use to create hot water
 - 50% of your clean-up labor



Commitment to Greater Outcomes

- The solution is made on-site and on-demand, which means you never run out!
- No inventory to order, faster and more efficient and the solution is as good or better than the products you are presently using.
- Our units require less than 1 AMP to operate.
- Our systems are modular which eliminates the need for costly infrastructure.



Industry Applications

Industry Application Integrations

Restaurants	Wastewater Treatment
Food Processing Plants	Agriculture
Air Quality Management	Janitorial (product replacement)
Medical & Health Care etc.	Large Venues (athletic complex)
Pet Food Plants	Hard Surface Sanitation
Transportation	And Many More!



Organisms that are Oxidized

Bacteria	Viruses
Fungus & Mold Spores	Yeast
Protozoa	Cysts
Fungal Pathogens	Algae



Bacteria

Achromobacter butyri NCI-9404

Aeromonas harveyi NC-2

Aeromonas salmonicida NC-1102

Bacillus anthracis

Bacillus cereus

B. coagulans

Bacillus globigii

Bacillus licheniformis

Bacillus megatherium sp.

Bacillus paratyphosus

B. prodigiosus

Bacillus subtilis

B. stearothermophilus

Clostridium botulinum

C. sporogenes

Clostridium tetoni

Cryptosporidium

Coliphage

Corynebacterium diphthriae

Eberthella typhos

Endamoeba histolica

Escherichia coli

Escherichia coli

Flavobacterium SP A-3

Leptospira canicola

Listeria

Micrococcus candidus

Micrococcus caseolyticus KM-15

Micrococcus sphaeroides

Mycobacterium leprae

Mycobacterium tuberculosis

Neisseria catarrhalis

Phytomonas tumefaciens

Proteus vulgaris

Pseudomonas aeruginosa

Pseudomonas

fluoriscens (biofilms)

Pseudomonas putida

Salmonella choleraesuis

Salmonella enteritidis

Salmonella typhimurium

Salmonella typhosa

Salmonella paratyphi

Sarcina lutea

Serratia marcescens

Shigella dysenteriae

Shigella flexnaria

Shigella paradysenteriae

Spirillum rubrum

Staphylococcus albus

Staphylococcus aureus

Streptococcus 'C'

Streptococcus faecalis

Streptococcus hemolyticus

Streptococcus lactis

Streptococcus salivarius

Streptococcus viridans

Torula rubra

Vibrio alginolyticus &

angwillarum

Vibrio cholerae

Vibrio comma

Virrio ichthyodermis NC-407

V. parahaemolyticus



Viruses

Adenovirus (type 7a)
Bacteriophage (E.coli)
Coxsackie A9, B3, & B5
Cryptosporidium
Echovirus 1, 5, 12, & 29
Encephalomyocarditis
Hepatitis A
HIV
GD V11 Virus
Onfectious hepatitis
Influenza
Legionella pneumophila
Polio virus (Poliomyelitus) 1, 2 & 3
Rotavirus
SARS-CoV-2
Tobacco mosaic
Vesicular Stomatitis

Fungus & Molds

Aspergillus candidus
Aspergillus flavus (yellowish-green)
Aspergillus glaucus (bluish-green)
Aspergillus niger (black)
Aspergillus terreus, saitoi & oryzae
Botrytis allii
Colletotrichum lagenarium
Fusarium oxysporum

Grotrichum
Mucor recomosus A & B
(white-gray)
Mucor piriformis
Oospora lactis (white)
Penicillium cyclopium
P. chrysogenum & citrinum

Penicillium digitatum (olive)
Penicillium glaucum
Penicillium expansum (olive)
Penicillium egyptiacum
Penicillium roqueforti (green)
Rhizopus nigricans (black)
Rhizopus stolonifer

Fungal Pathogens

Alternaria solani
Botrytis cinerea
Fusarium oxysporum
Monilinia fruticola
Monilinia laxa
Pythium ultimum

Phytophthora erythroseptica
Phytophthora parasitica
Rhizoctonia solani
Rhizopus stolonifera
Sclerotium rolfsii
Sclerotinia sclerotiorum

Protozoa

Paramecium
Nematode eggs
Chlorella vulgaris (Algae)
All Pathogenic and Non-pathogenic
forms of Protozoa



Yeast

Baker's yeast
Candida albicans-all forms
Common yeast cake
saccharomyces cerevisiae
saccharomyces ellipsoideus
saccharomyces sp.

Cysts

Cryptosporidium parvum
Giardia lamblia
Giardia muris

Algae

Chlorella vulgaris
Thamnidium
Trichoderma viride
Verticillium albo-atrum
Verticilliu



Regulatory Approvals

- WHO (World Health Organization)
 - The WHO states that a cleaning solution with a 650 ORP (oxidation reduction potential) kills 99.9% of all pathogens such as bacteria, viruses, germs, etc. Bio-Safe Technology ranges from 670 to 800 ORP when tested with calibrated ORP meter.
- FDA (Food & Drug Administration)
 - The FDA on June 26th, 2001 the U.S. FDA approved the use of ozone as an antimicrobial agent in the gas or liquid phases for direct contact with foods. [2004] 21 CFR 173,368 Ozone may be safely used as an antimicrobial agent in the treatment, storage, & processing of foods, including poultry.



Regulatory Approvals

- USDA

- Approved as a Hard Surface Sanitizer. The NSF White Book Listings, Section II – USDA Approval for Hard-Surface Sanitation.
- FSIS Directive 7120.1 Since January 2000, the USDA/FSIS has officially accepted ozone as safe and suitable for use in the production of meat and poultry products. In accordance with current industry standards of good manufacturing practice.
- USDA/National Organic Program (NOP). 205,605 Nonagricultural (non-organic) substances allowed as ingredients in or on processed products labeled as “organic” or “made with organic (specified ingredients or food groups(s))” includes ozone and is one of the synthetic nonagricultural substances that may be used as ingredients in or on processed products labeled as “organic” or “made with organic” only in accordance with any restrictions specified.



Regulatory Approvals

The **FDA** followed by other regulatory bodies such as the USDA, EPA, FIFRA, NSF, and OSHA, granted the use of aqueous ozone as “Generally Recognized as Safe” for the sanitization and disinfection of foods. Bio-Safe cleans and controls microorganisms, that are common to hard surfaces.

EPA Products used to kill viruses and bacteria on surfaces are registered as Antimicrobial Pesticides. Sanitizers and disinfectants are two types of Antimicrobial Pesticides. Bio-Safe Technology is an approved **ANTIMICROBIAL** in both gas and liquid form.



Intellectual Property

Issued Patents			Pending Applications	International Patents	Provisional Patents	U.S. Trademarks
U.S. 10,231,466	U.S. 10,232,070	U.S. 10,232,071	16/744,877	PCT/US21/46350	63/233,600	6,452,610
U.S. 10,233,583	U.S. 10,233,584	U.S. 10,238,125	17/391,152	PCT/US21/44022		6,452,613
U.S. 10,426,855	U.S. 10,597,317	U.S. 10,834,929		PCT/US21/47089		6,601,987
U.S. 10,836,661	U.S. 11,019,827	U.S. 11,045,571		PCT/US21/63968		
U.S. 11,078,078	U.S. 11,078,079	U.S. 11,097,946		PCT/US21/63076		
U.S. 11,098,910	U.S. 11,130,104	U.S. 11,198,627				
U.S. 11,214,503	U.S. 11,247,899	U.S. 11,274,053				
U.S. 11,292,735	U.S. 11,305,991	U.S. 11,312,644				



Additional Applications and Product Information

www.biosecuritytechnology.com

Technical Information

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Bio-Safe[®]

by BioSecurity Technology